ONTOLOGY ORIENTED DIAGNOSTIC MODEL FOR MEDICINE BASED ON RELATION REFINEMENT

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ABSTRACT

We define the diagnosis in Traditional Chinese Medicine (TCM) as discovering the fuzzy relations between symptoms and syndromes. An Ontology-oriented Diagnosis System (ODS) is created to address the knowledge-based diagnosis based on a well-defined ontology of syndromes. The ontology transforms the implicit relationships among syndromes into a machine-interpretable model. The clinical data used for feature selection is collected .

Keywords: Introduction, OODS, Problem, Conclusion, Model

I. INTRODUCTION

Ontology Oriented is an emerging Knowledge Engineering paradigm. It aims at the discovering, documenting and maintaining a set of requirements. Knowledge Engineering (KE) is believed to promote better achievement of Requirement Document and thus to improve the quality of software systems and the efficiency of software development. As a result, Ontology Oriented (OO) is gaining increasing attention from academic organizations as well as from industrial companies' research firms.

Ontology-Oriented consists of a series of development discipline, covering a wide span of development activities in the software development lifecycle. OOD focuses on the systematic, identification, modularization, composition and analysis of reusable requirement which are evident at the requirement engineering stage. Hundreds of papers regarding OO have been published [23]. Researchers in OOD communities believe that identifying and capturing reusable requirement early on, at the requirement engineering stage, will benefit downstream development activities such as architecture design and implementation [6]. The identified reusable requirement may offer valuable insight at the architecture design and implementation stages. They often eventually correspond to reusable requirement in architecture, and then in code. As a result, pedigrees of reusable requirement throughout the entire software development lifecycle will be established, improving the traceability of a wide range of requirements in a software system and facilitating the system's resolvability. Moreover, identifying reusable requirement at the requirement engineering stage may help to reveal the scope of each requirement, detect potential conflicts between reusable requirements and support trade-off negotiation.

However, there is limited evidence that early identification of requirements is a productive software engineering practice. First of all, although a great amount of literature on OOD has been published worldwide, none of these papers, to the best of our knowledge, addresses this question. The Knowledge of early identification and management of reusable requirement may outweigh the benefits. Intuitively, an argument can be made that this is especially the case when requirements are not fully developed – when there is a large amount of uncertainty and volatility. Secondly, most proposed Algorithm approaches in the literature are supported with small scale, simplified, and sometimes artificial examples. Therefore, there is no convincing evidence that proposed Algorithm approaches are feasible and productive when applied to larger scale real world projects. A careful analysis of a real world software requirement document could provide some insight into the value or lack of value of the proposed SRR approaches.

Moreover, most proposed OOD approaches in the literature aim at identifying and thus capturing reusable requirement from well structured, formal (or at least semi-formal) knowledge engineering requirement documents that are organized. Only a few Knowledge reuse approaches deal with reusable requirement in less structured requirement documents such as informal software requirement specifications. There is not sufficient evidence to show that identifying and capturing reusable requirement is feasible for less structured and informal requirement documents.

II. OODS (ONTOLOGY-ORIENTED DIAGNOSIS SYSTEM)

Applying mathematical models and information technologies to medical intelligence has long been a hot spot in the academic research domains and real-life health care applications. Plenty of the efforts in this field allow researchers and medical practitioners to identify required information more efficiently, discover new substances or relationships, and integrate different sources of information more easily.

Traditional Medicine, known as TM, that is an ancient and unique branch of medical science, which probably covers broad range of practices such as herb medicine, acupuncture, attracts much attention on how to defeat the inconsistency of therapeutic patterns and vagueness of medical terms in TM in order to improve the user experience of TM diagnosis through the traditional methods and therapy.The basic theories of TM are based on the ancient philosophy of holistic understanding of the universe and the human body, which are commonly associated with the flow and the balancing of complementary opposites, cough and cold, or five elements. Based on the interacting forces in the human body, the forms of many pathological conditions in TM usually differ from that of identifiable diseases in terminology of the Western medicine. “Syndrome” (also called pattern) refers to a pattern of disharmony or functional disturbance within the functional entities that the TM model of the body is composed of. A “disease” in TM refers to disease entity or disease category, focusing on the macroscopic classification of specific manifestations. In TM diagnosis, the therapy is determined mainly according to the pattern rather than the disease. Two patients with the same disease but different patterns will receive different therapy; vice versa patients with similar patterns might receive similar therapy even if their diseases are different. Hence, the concept of “syndrome differentiation” is of great importance in deciding the diagnosis for patients. But the difficulty of differentiating syndromes is rooted in the unclear definition of the range of syndromes, which means the determination of specific syndromes, the similarity among syndrome patterns, and this information are usually hidden in the literature texts or the doctors’ experience.

III.PROPOSED MODEL FOR OODS

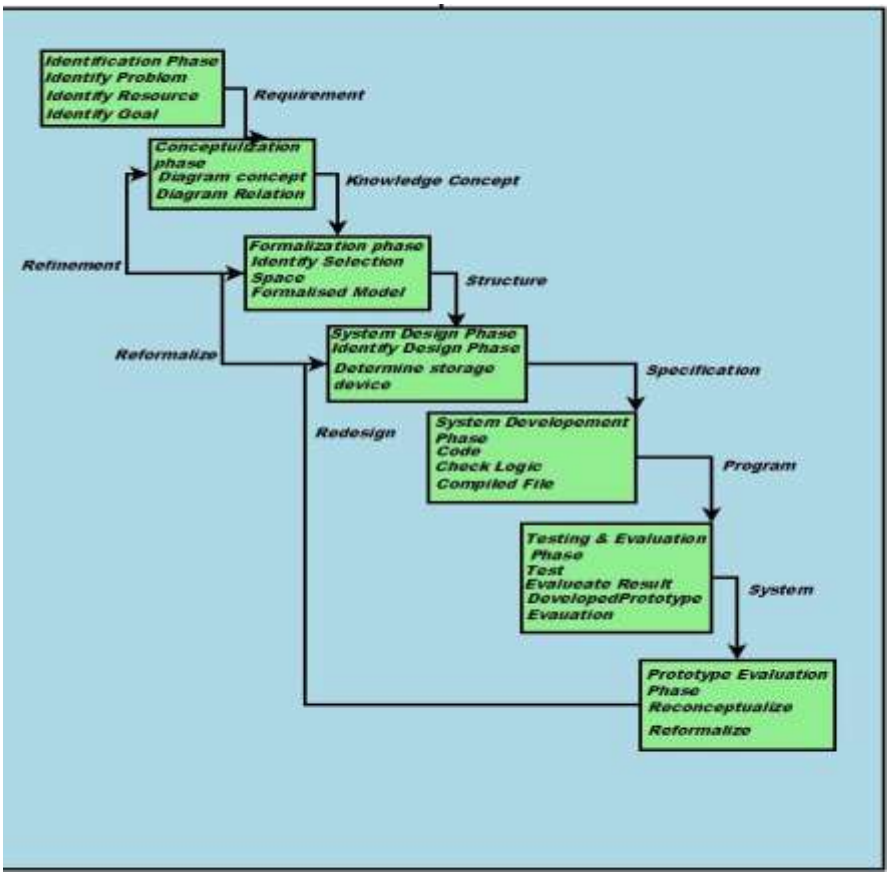

Fig.3.1: Ontology-Oriented Diagnostic model

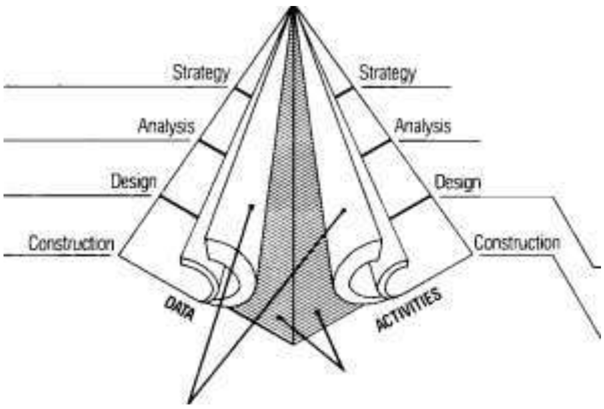

Fig3.2: Basic Model for Knowledge Based System Development

IV. PROBLEM OUTLINE

An alternative source of health care, TM is interpreted as to have intangible connections between human and nature rather than anatomical parts, which leads to complex semantic inclusion relations. We have done some researches on expressing biological facts into ontological statements, by constructing domain ontology as RDF models. A medical diagnosis problem can be formed as a probabilistic relation between a group of symptoms and a diagnosis.

Let be the set of symptoms to be queried, in which is the cardinality of, namely, the number of symptoms. Each is a professional description of a pathological symptom, such as cough and fever. The diagnostic result is an integrated answer of some disease and at least one syndrome, meaning that the patient catches a disease named with a collection of syndromes.

The difficulties in determining this relation between and lie on the obscure descriptions of each clinic case and uncertain (expertise-dependent) differentiation of syndromes. As an outsider of medical science, we are suggested by the medical experts that a relation table should be defined in advance, in which there are two kinds of relations and Represents the correspondence between a specific disease and a set of symptoms and represents the correspondence between a specific syndrome between a set of symptoms, and a table of these correspondence relations form a feature selection source for medical diagnosis. For example, we could obtain a minimum associated set of symptoms for each disease or syndrome such as by analyzing prior clinical data, which is formatted as (disease or syndrome, related symptoms). The process of clustering and filtering data is a variant of set intersection problem. We put our considerations on the performance and efficiency of the algorithm.

In order to rectify the data biases of clinical data and facilitate knowledge-based diagnosis, we define a knowledge base which takes the role of the conceptual model. In the procedure of automatic diagnosis, the user-queried symptoms are compared with the relation generated from the preprocessed relation table and the knowledge base. By calculating the similarity, the diagnostic result will be given as the combined answer of a disease and a group of syndromes.

The process of Chinese medical diagnosis can be concluded as an expertise-dependent case search based on observed pathological patterns, where expertise is consisted of practical experiences and theoretical principles. In this paper, we integrate both practical experiences and theoretical principles together to construct a complete computation model for reliable medical diagnosis.

V. RESEARCH OBJECTIVE

Objective 1: A feature set extraction method based on a revised adaptive set intersection algorithm for symptoms and syndromes.

Objective 2: A medical diagnosis can be formed as a probabilistic relation between a group of symptoms and a diagnosis.

VI. RESEARCH METHODOLOGY

KADS Methodology for developing AI (Knowledge Based) Systems. KADS traditionally has employed a step-wise Life Cycle Model (LCM), consisting of analysis, design, implementation, installation, use and maintenance.

Knowledge-based DSS is a category of DSS built using an expert system . These systems have their own expertise based on knowledge on many aspects of the problem: In the application domain, the definitions of problems within that domain or related to the domain and the necessary skill and methods proposed to solve them The knowledge of the system is often coded as a set of rules by one or more human experts: this kind of systems are referred to as rule-based expert systems.

Along with the development of Expert and Decision Support Systems, in recent years in bioinformatics a new type of tools, called Workflow Management Systems (WFMS) have begun to spread out. WFMSs provide a simple way to build and run a custom experiment and designed and tasted software using the most common bioinformatics resources, like online databases, software and algorithms.

The most used and famous WFMS for bioinformatics is Taverna it is able to automatically integrate tools on databases available both locally and on the web in order to build workflows of complex tasks; to run the workflows and to show results in different formats. The system works by means of a Graphical user Interface.

VII. ALGORITHM BASED ON ONTOLOGY

In this algorithm there is multiple set of symptoms and syndrome diagnose. Due to the generation development some diseases are not identified and there is some cases of symptoms and syndromes are enhanced. To refine these syndromes and symptoms this algorithm is designed. In this algorithm took a number of clinical cases and match the symptoms and syndromes. Hare through this algorithm is refined symptoms and syndromes resulted as compared to traditional medicines.

```
Input: multi-set
Output:
if  then
    return null;
End
else if  then
    return . get (0);
End
 = generateRatioNum (. size());
Let largest elements of the multi-set ;
Let ;
Let element of ;
Mark green all the sets such that = , and remove all copies of from ;
Mark red all the sets such that ;
Mark white all the sets such that < , and remove from ;
While  do
  if  sets are red then
      if  sets are green then

      end
      Take (white sets) of the green sets and mark them white;
```

For each remaining green set , insert in the first element of which is , and change the mark of to red;

Let ;

change the mark to green for all the sets which have as a representative in , and remove from ;

end

Let be the next white set;

if then

Mark in green;

end

else

Insert in the first element of which is strictly larger than , and mark in red;

end

End

VIII. CONCLUSION

The ontology assisted diagnostic system interprets the correspondence between symptoms and syndromes in an integrated method of minimum set mapping and ontology refinement, instead of static rules which are difficult to conclude. Web users could access the online user interface and fetch a diagnostic result according to the specific input symptoms.

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